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Glacier Lake Dams

MANUAL FOR OPERATION AND MAINTENANCE

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Table of Contents

	<u>Page</u>
OVERVIEW	1
Glacier Lake Reservoir Location Map (Figure 1)	2
Rock Creek Project (Figure 2)	3
Glacier Lake Dam General Layout (Figure 3)	4
Glacier Lake Reservoir Access Route (Figure 4).....	5
Access Road Detail Map (Figure 5).....	6
STATISTICAL INFORMATION.....	7
OPERATING PROCEDURES	11
Method and Schedule of Operation.....	11
Safe Drawdown.....	12
Limits of Appurtenances	12
Dam Operator.....	12
Storage Determination	13
Weather Monitoring	14
Interaction with Other Dams.....	14
Emergency.....	14
INSPECTION AND MONITORING	15
Structural Features Inspection	15
Dam Inspection.....	16
Seepage Monitoring.....	16
MAINTENANCE	17
Routine Maintenance	17
Annual Maintenance.....	18
Record Keeping	18
REFERENCES.....	19
APPENDICES	21
A. RATING CURVES AND TABLES	A1
Table 1. SLOPE/ELEVATION/STORAGE TABLE.....	A2
Table 2. ACTIVE STORAGE TABLE.....	A3
Table 3. SPILLWAY RATING CURVE AND TABLE.....	A4
Table 4. OUTFLOW RATING CURVE AND TABLE.....	A5
B. INSPECTION REPORT FORM.....	B1
C. DISTRIBUTION LIST.....	C1
D. PROJECT DRAWINGS	D1

OVERVIEW

Both Glacier Lake dams are located on public land in the Custer National Forest administered by the U. S. Forest Service. The project is operated under a U.S. Forest Service special-use permit. Glacier Lake is located at the headwaters of Rock Creek in Carbon County, approximately 19 miles southwest of Red Lodge, Montana (see Figures 1 and 2). Figure 3 provides a general layout of the dam, spillway and outlet works. Figures 4 and 5 provide access route details.

The dams are owned by the Montana Department of Natural Resources and Conservation (DNRC) and are managed by the State Water Projects Bureau (SWPB) of the DNRC. The Rock Creek Water Users Association (herein called the “association”) operates and maintains the dams. Glacier Lake is part of the DNRC's rock Creek Project.

Both dams, completed in 1937, have a concrete upstream face, and a rockfill crest and downstream face. The North Dam is 57 feet high and 230 feet long. The South Dam is 20 feet high and 253 feet long. The spillway is an uncontrolled, excavated rock channel located between the dams with a concrete weir 82 feet long and a capacity of 2,650 cfs.

The low level outlet, located in the left abutment of the North Dam, consists of a rock tunnel approximately 6.5 feet high and 5.5 feet wide. The discharge is controlled with a 48-inch by 48-inch vertical slide gate located in a single cell wet tower. The manual control mechanism is located in a wooden gate house on the dam crest. The maximum capacity of the outlet is 472 cubic feet per second (cfs). The outlet releases water into the Rock Creek drainage.

Water from the reservoir is primarily used to supplement Rock Creek flows during late season irrigation. The reservoir also is used for water-based recreation.

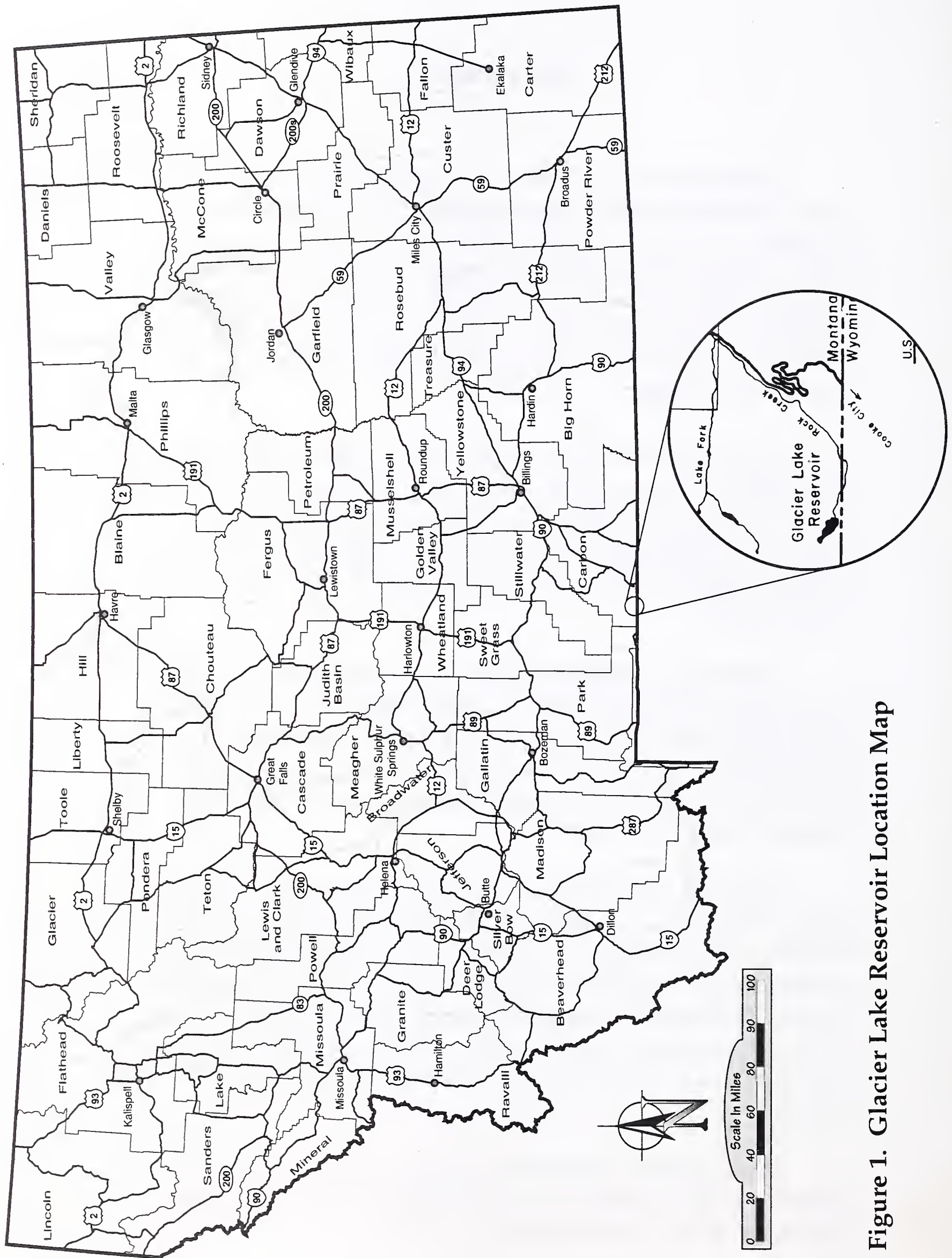


Figure 1. Glacier Lake Reservoir Location Map

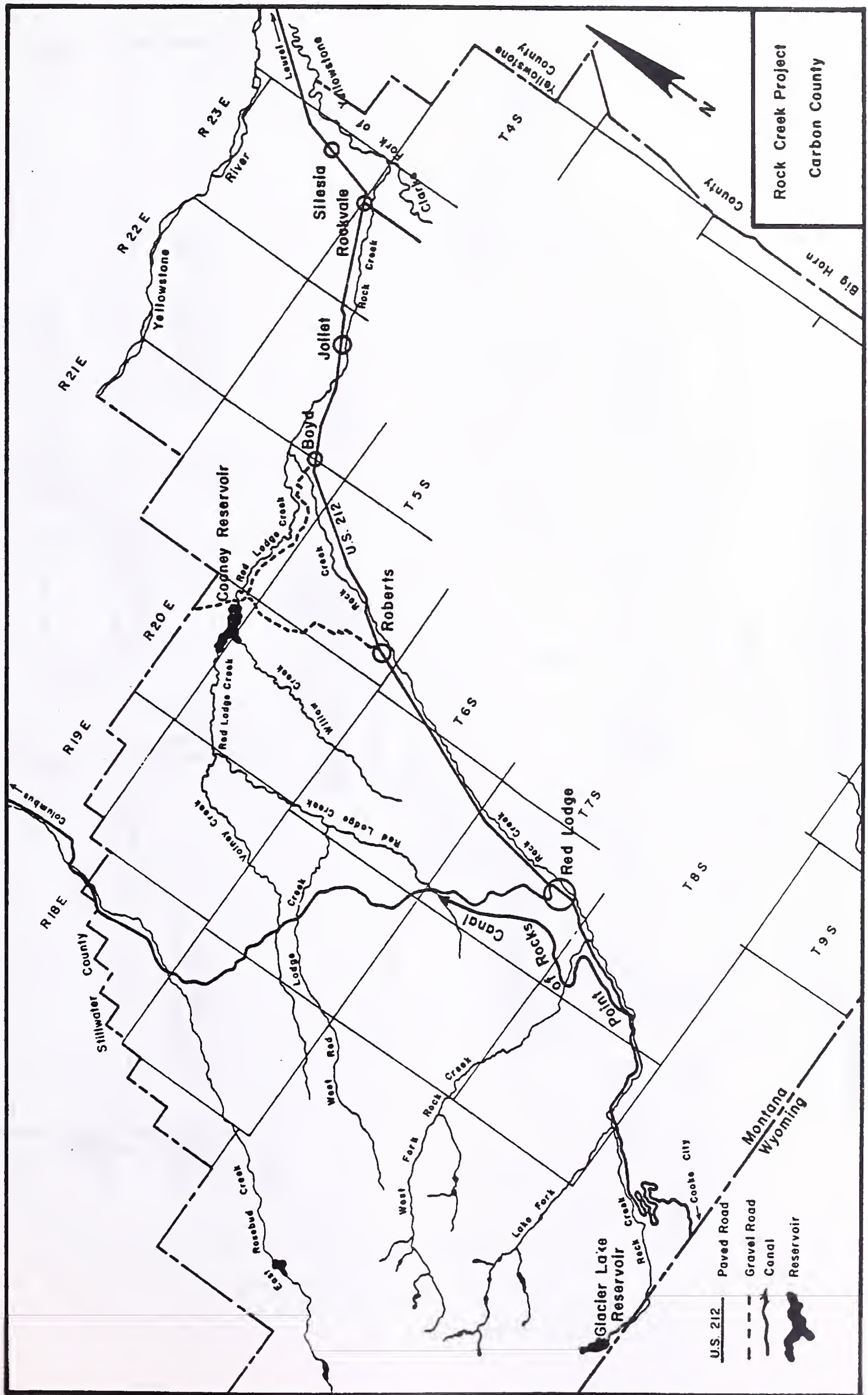
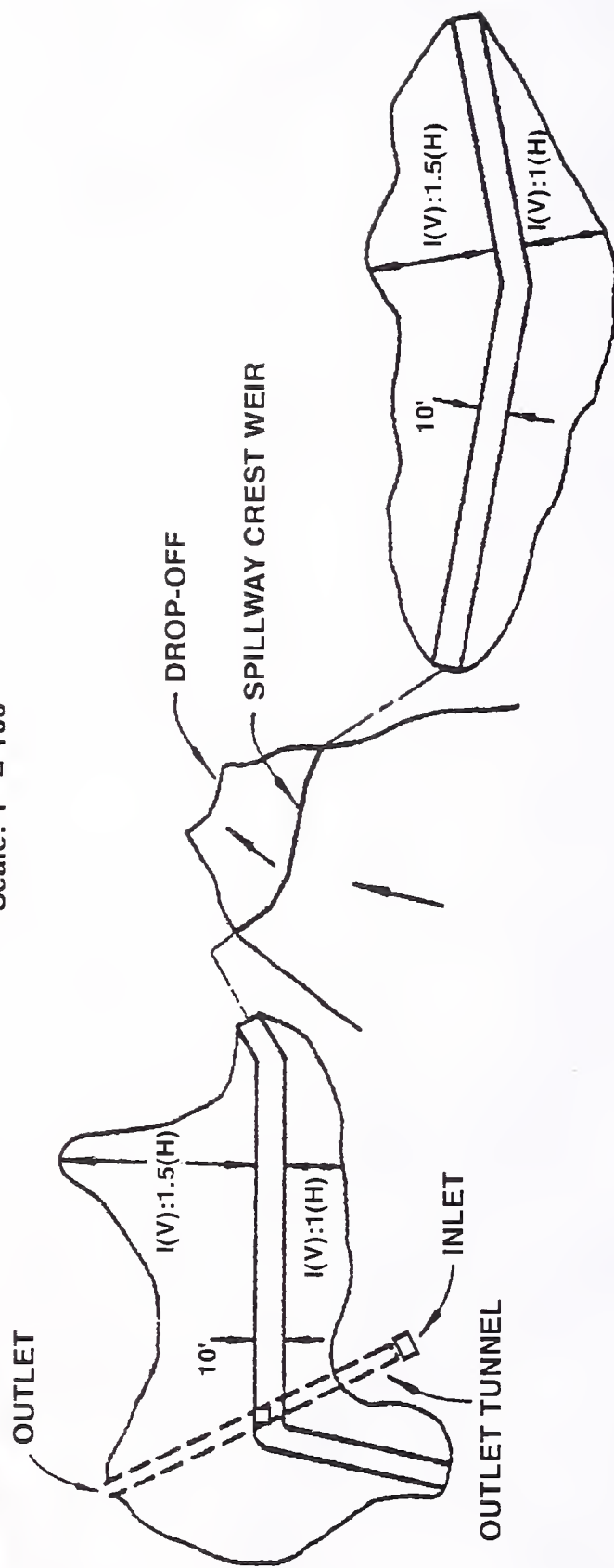


Figure 2. Rock Creek Project



Existing Project Plan

Scale: 1" = 100'



Existing Centerline Profile

Scale: 1" = 100'(H); 1" = 10'(V)

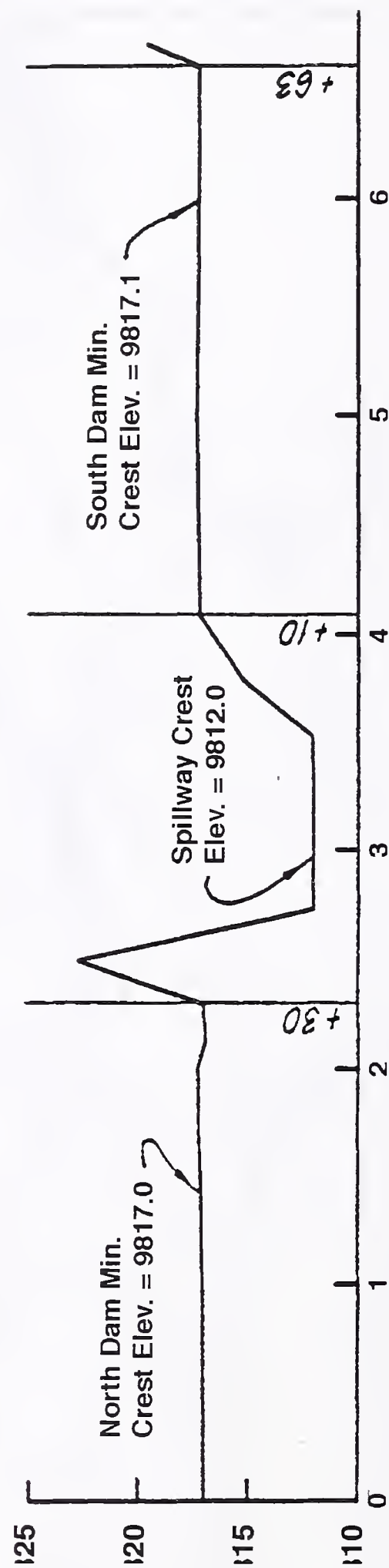


Figure 3. Glacier Lake Dam General Layout

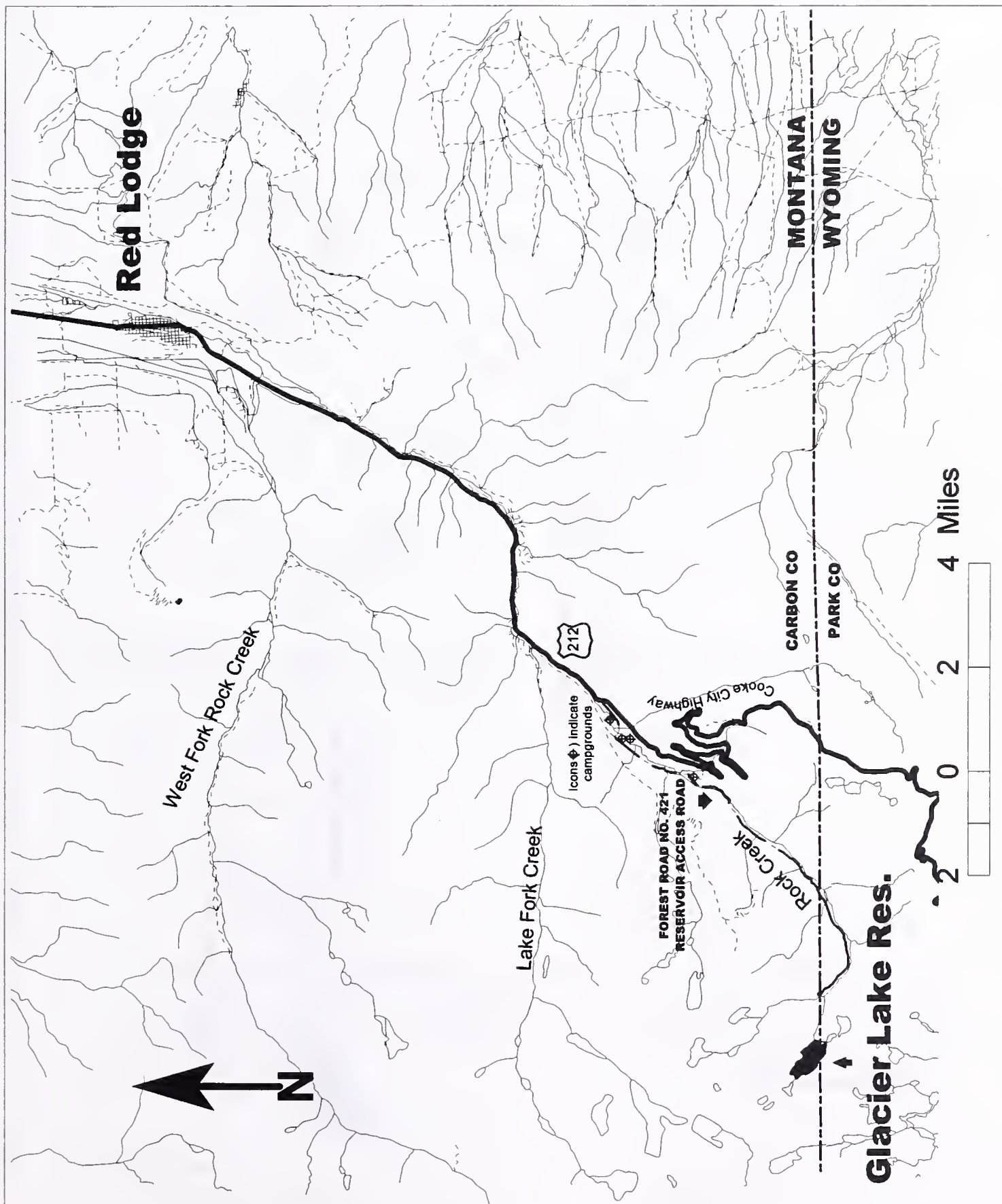


Figure 4. GLACIER LAKE RESERVOIR ACCESS ROUTE

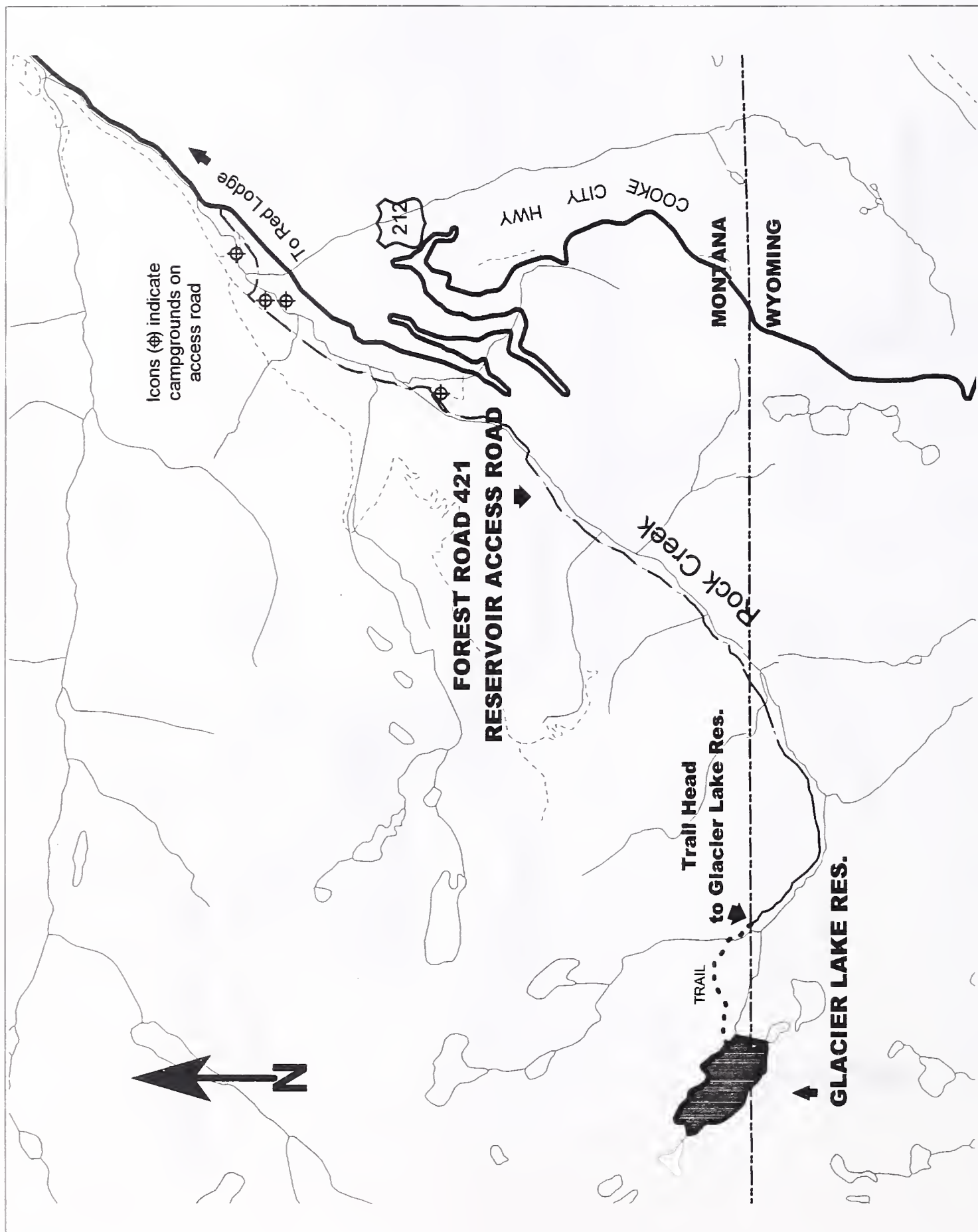


Figure 5. ACCESS ROAD DETAIL FROM TURNOFF POINT ON THE COOKE CITY HIGHWAY (212).

STATISTICAL INFORMATION

1. General

a. Owner	State Montana Department of Natural Resources and Conservation (DNRC).
b. Operator	Rock Creek Water Users Association.
c. Location	Section 29 Township 9 South, Range 18 East Carbon County Montana Principal Meridian
d. Latitude, North Dam	45.050°
Longitude, North Dam	109.532°
Latitude, South Dam	45.033°
Longitude, South Dam	109.532°
e. County -- State	Carbon County, Montana
f. Watershed Location	Rock Creek.

2. Principle Elevations (feet above mean sea level)

a. Minimum Dam Crest	9817.0 feet
b. Normal Full Pool	9812.0 feet
c. Spillway Crest	9812.0 feet
d. Outlet Works	
Inlet Invert	9780.0 feet (estimated)
Discharge Invert	9779.5 feet

Note: All elevations are referenced from the spillway crest elevation as shown on the State Water Conservation Board construction plans. Datum is the National Geodetic Vertical Datum (NGVD).

3. Reservoir

a. Surface Area (at normal full pool)	151 acres
b. Drainage Area	3.4 square miles

4. Storage

- | | |
|--|-----------------|
| a. Maximum Storage
(at dam crest) | 4,980 acre-feet |
| b. Active Storage
(at spillway crest) | 4,200 acre-feet |
| c. Maximum Surcharge
(from spillway to dam crest) | 780 acre-feet |
| d. Total Controlled Storage | |
| North Dam | 4980 acre-feet |
| South Dam | 2850 acre-feet |

5. Hydrology

- | | |
|------------------------|---------------------------------|
| a. Inflow Design Flood | PMF 33,490 cfs, 3,390 acre-feet |
|------------------------|---------------------------------|

6. Embankment (North Dam)

- | | |
|---------------------|--------------------------------------|
| a. Type | Rockfill with concrete upstream face |
| b. Hydraulic Height | 57 feet |
| c. Crest Length | 230 feet |
| d. Crest Width | 10 feet |
| e. Upstream Slope | 1(v) on 1(h) |
| f. Downstream Slope | 1(v) on 1.5(h) |

7. Embankment (South Dam)

- | | |
|---------------------|--------------------------------------|
| a. Type | Rockfill with concrete upstream face |
| b. Hydraulic Height | 20 feet |
| c. Crest Length | 253 feet |
| d. Crest Width | 10 feet |
| e. Upstream Slope | 1(v) on 1(h) |
| f. Downstream Slope | 1(v) on 1.5(h) |

8. Outlet Works

- | | |
|---|---|
| a. Size | Excavated rock tunnel: 6.5 ft. high by 5.5 ft. wide (approximately) |
| b. Control | 48 inch x 48 inch vertical slide gate with the control located on dam crest |
| c. Control Tower | Single cell wet tower |
| d. Length | 120 feet |
| e. Normal Tailwater | Not applicable |
| f. Discharge Capacity (pool at dam crest) | 472 cfs |

9. Spillway

- | | |
|---------------------------------|----------------------------|
| a. Type | Uncontrolled Concrete Weir |
| b. Length | 82.0 feet |
| c. Capacity (pool at dam crest) | 2,650 cfs. |

OPERATING PROCEDURES

The Rock Creek Water Users Association operates Glacier Lake Reservoir to provide an adequate supply of irrigation water to meet contracts with the water users without exceeding safe storage and flow levels, and to insure safe operation of the project.

METHOD AND SCHEDULE OF OPERATION

The association's goal is to have the reservoir full before contract holders start putting in calls for water.

The date irrigation releases begin varies from year to year, with July 1 being the earliest. During typical years, releases begin around August 1. Irrigation releases usually end by September 30, as specified in the water purchase contracts. The actual dates that releases begin and end depend on the year's climatological and hydrological conditions.

The normal full reservoir elevation is 9812.0 feet with 4,200 acre-feet active storage.

Maximum Winter Storage: The maximum reservoir elevation for winter storage is 9,810.0 feet with 3,900.0 acre-feet of storage. This winter maximum helps prevent damage to the concrete and embankment from wind-driven waves and ice.

Minimum Winter Storage: The minimum reservoir elevation for winter storage is 9,788.0 feet with 705 acre-feet of storage. This winter minimum helps prevent ice damage to the inlet structure for the outlet works.

SAFE DRAWDOWN

Because neither of the Glacier Dams has been thoroughly investigated relative to their structural stability, the SWPB recommends that drawdown rates not exceed one foot per day.

LIMITS OF APPURTENANCES

Appurtenances at Glacier Lake Dam include the outlet works and tunnel, and spillway. With the reservoir pool at the dam crest, the outlet works capacity is 472 cfs and the spillway will discharge 2,650. Rating curves and tables for the outlet works and spillway are shown in Appendix A.

The maximum opening for the gate is four feet. Openings in excess of this amount may damage the gate, gate frame, gate stem or the gate operating pedestal. The four feet of operation is measured on the exposed portion of the gate stem between the top of the pedestal and the bottom of the stop nut.

DAM OPERATOR

The responsibility for the operation of the dams and reservoir rests with the association and its dam operator. The dam operator is generally authorized to operate the reservoir to meet the association's goal of providing an adequate supply of irrigation water to meet contracts with water users without exceeding safe storage and flow levels. The dam operator's specific responsibilities are to:

1. Operate the mechanical features of the outlet works.
2. Coordinate filling the reservoir and releasing the water.
3. Notify the SWPB of any unusual occurrences such as excessive seepage, spillway flowing, or problems with the outlet.
4. Perform various maintenance tasks.

Typically, the out-going dam operator, the association, and the SWPB train a new dam operator. The dam operator's training focuses on the mechanical operation of the gate, measurement of the storage level, measurement of the rate of water release, and record keeping. The outlet gate is operated manually with a hand crank.

The outlet works are to be used for controlling the release of irrigation water and not for providing emergency relief.

The dam operator is normally available to observe the dams and perform operating functions during the filling and irrigation seasons, and is available when necessary at other times of the year. Communication among the dam operator, the association, and the SWPB usually takes place by telephone. Although radio communications are not routinely available, during emergencies or unusual occurrences, radio communications may be established so the dam operator can speak directly with county authorities and communicate indirectly with the SWPB (see Glacier Lakes Dams Emergency Plan).

Note: Due to the high elevation and snow, the dam is generally only accessible from mid-June through mid-October.

STORAGE DETERMINATION

Storage in the reservoir and the elevation of the reservoir surface are determined by taking a slope measurement. Measure the slope distance down the concrete face from the top of the dam to the water surface. The elevation of the reservoir surface and the storage can then be found using the Slope-Elevation-Storage Table in Appendix A.

WEATHER MONITORING

The dam operator monitors weather conditions through local weather forecasts and the National Weather Service.

If severe flooding is anticipated, the NWS Billings Office (800-240-4596 or 406-652-2314) should be contacted for information about the storm, such as the estimated storm intensity and duration, runoff duration (above base flow), and total flood volume of the storm in the Rock Creek drainage.

INTERACTION WITH OTHER DAMS

Glacier Lake dams and reservoir are at the headwaters of the Rock Creek drainage. There are no other dams above or below the Glacier Lake which would be impacted by the operations of the dam. Interaction with other dams is not a concern during normal operations.

EMERGENCY

If it appears that either Glacier Lake dam is about to breach, or during emergency operations, the dam operator will initiate the **Glacier Lake Dam Emergency Action Plan.**

INSPECTION AND MONITORING

The SWPB inspects the dams annually. Appendix B includes an example of a SWPB inspection report form. In addition to annual inspections, SWPB personnel will inspect the dams and reservoir during and after heavy runoff, severe rainstorms and windstorms, during high storage periods; and after an earthquake. The embankments are not monitored by instrumentation.

STRUCTURAL FEATURES INSPECTION

Structural features include the gatehouse, spillway, and outlet works (Figure 3). The SWPB will inspect these structures annually as part of its inspection program. Items to be checked or noted include, but are not limited to:

1. Outlet Work
 - a. Any differential settlement or movement resulting in cracking of the tunnel.
 - b. Erosion of the seals or the conduit by cavitation immediately downstream of the gate.
 - c. Major seepage of water into the tunnel.
 - d. Major deterioration of exposed concrete due to freeze/thaw cycles or sulfate reactions.
 - e. Operation of the gate through a full cycle if lake level allows it.
 - f. Corrosion of any metal.
 - g. Proper lubrication and cleaning of the pedestal.
2. Gatehouse - Any damage or vandalism.
3. Spillway
 - a. Erosion of the spillway channel.
 - b. Blockage of the approach or exit channel.
 - c. Deterioration of concrete.

DAM INSPECTION

The upstream face of each dam is covered with concrete. The concrete thickness is 12 inches thick from the bottom to the top. There is grout paving that the concrete paving sets on. The concrete of each dam is inspected for spalling, cracking, excessive freeze/thaw damage, and any differential settlement or movement.

The crest and downstream face of each dam is rock fill. The crest and downstream face of each dam is inspected for displacements, depressions, and burrows, etc.

SEEPAGE MONITORING

Seepage has been observed at the toe of the North Dam embankment on the left groin abutment. The seep is usually 2 gallons per minute (gpm) or less. Seepage also occurs above the outlet on the right side. This area has had estimated flows of 1 cubic feet per second (cfs).

There are two seep areas at the toe of the South Dam. These areas are characterized by green grass and wet areas. Flow has been estimated to be less than 1 gpm.

No seepage measuring equipment has been installed at either of the dams.

The seepage will be observed and monitored by the dam operator during regular visits and by the SWPB during annual inspections.

MAINTENANCE

The association is responsible for routine maintenance of the project. In addition, the SWPB may also identify items that need maintenance or repair during the annual inspection.

ROUTINE MAINTENANCE

To protect the dams and keep them in good working order, the dam operator during normal visits to the dam will watch for and identify any potential maintenance requirements. As soon as a need is identified, the dam operator needs to schedule and perform the routine maintenance.

Items that may occasionally need attention include, but are not limited to:

1. *Lubrication and cleaning of gate-operating mechanism.*
2. *Rodent damage.* The rodents will be removed or destroyed, and any burrow holes should be filled immediately.
3. *Upstream slope concrete.* Concrete normally needs to be maintained annually. Deterioration, cracks, freeze/thaw damage should be repaired annually.
4. *Debris or silt plugging the spillway or outlet channel.* Accumulated debris should be removed annually.
5. *Vegetative cover on downstream slopes.* Good vegetative cover must be maintained , but large brush or any trees should be removed.
6. *Missing Rocks.* Replace any missing rocks on the crest or downstream face of each dam.
7. *Noxious Weeds.* Weeds on and around the dams should be sprayed on at least an annual basis.
8. *Trash.* Remove any trash from the gatehouse or around the dams.

ANNUAL MAINTENANCE

The SWPB conducts annual inspections of the Glacier Lake Dams and Reservoir. During these inspections, any item requiring annual maintenance will be identified and recorded. Items that may need annual maintenance include the front face of both dams, spillway, outlet works, gate, and gatehouse. Other routine items needing immediate attention, such as the need to remove trees or brush, will also be noted.

After the inspection, the SWPB sends the association a Dam Safety Inspection Report and a Maintenance Schedule Report. The reports identify items that need maintenance and provide a schedule of when the maintenance tasks need to be completed. The association will be responsible for performing the maintenance items within the times specified.

The dam operator or association members may perform the maintenance tasks. However, major repairs will likely be handled by a contractor. The SWPB may assist in contracting for repairs and may supervise the work.

RECORD KEEPING

The SWPB maintains records, including photographs, of all inspections and maintenance requirements. These records also include seepage monitoring observations. Anyone who wants to review these records may do so in the SWPB 's office at the Department of Natural Resources and Conservation in Helena.

The dam operator will keep records of the reservoir elevation, seepage observations or measurements, and any unusual conditions. These records may be reviewed at the dam operators house.

REFERENCES

Hoskins-Western-Sonderegger, Inc. April 1981. Phase One Inspection Report, National Dam Safety Program, Upper Yellowstone Basin, Glacier Lake Dams, Carbon County, Montana, MT-68 (North Dam), (MT-1446 (South Dam) Carbon County, Montana. Prepared for the State of Montana (DNRC) under the U.S. Army Corps of Engineers National Dam Safety Program.

APPENDICES

APPENDIX A

RATING CURVES AND TABLES

GLACIER LAKE RESERVOIR

Storage values based on 1937 original hand surveys of the reservoir.

Slope distance measured from top of dam down the concrete face.

Slope Distance 7.1 feet --- Spillway Crest

[illegible]

TABLE 2. ACTIVE STORAGE IN ACRE-FEET

GLACIER LAKE RESERVOIR

ELEV	0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9
9780	0	7	14	21	28	35	42	49	56	63
9781	70	80	90	100	110	120	130	140	150	160
9782	170	181	193	204	216	227	239	250	262	273
9783	285	297	309	321	333	345	357	369	381	393
9784	405	417	430	442	455	467	480	490	505	517
9785	530	542	555	567	580	592	605	617	630	642
9786	655	667	680	692	705	717	730	742	755	767
9787	780	792	805	817	830	842	855	867	880	892
9788	905	917	930	942	955	967	980	992	1005	1017
9789	1030	1042	1055	1067	1080	1092	1105	1117	1130	1142
9790	1155	1167	1180	1192	1205	1217	1230	1242	1255	1267
9791	1280	1293	1306	1319	1332	1345	1358	1371	1384	1397
9792	1410	1423	1436	1449	1462	1475	1488	1501	1514	1527
9793	1540	1553	1566	1579	1592	1605	1618	1631	1644	1657
9794	1670	1683	1696	1709	1722	1735	1748	1761	1744	1787
9795	1800	1813	1827	1840	1854	1867	1881	1894	1908	1921
9796	1935	1948	1962	1975	1989	2002	2016	2029	2043	2056
9797	2070	2083	2097	2110	2124	2137	2151	2164	2178	2191
9798	2205	2218	2232	2245	2259	2272	2286	2299	2313	2326
9799	2340	2353	2367	2380	2394	2407	2421	2434	2448	2461
9800	2475	2489	2503	2517	2531	2545	2559	2573	2587	2601
9801	2615	2629	2643	2657	2671	2685	2699	2713	2727	2741
9802	2755	2769	2783	2797	2811	2825	2839	2853	2867	2881
9803	2895	2909	2923	2937	2951	2965	2979	2993	3007	3021
9804	3035	3049	3063	3077	3091	3105	3119	3133	3147	3161
9805	3175	3189	3204	3218	3233	3247	3262	3276	3291	3305
9806	3320	3334	3349	3363	3378	3392	3407	3421	3436	3450
9807	3465	3479	3494	3508	3523	3537	3552	3566	3581	3595
9808	3610	3624	3639	3653	3668	3682	3697	3711	3726	3740
9809	3755	3769	3784	3798	3813	3827	3842	3856	3871	3885
9810	3900	3915	3930	3945	3960	3975	3990	4005	4020	4035
9811	4050	4065	4080	4095	4110	4125	4140	4155	4171	4185
9812	4200	4216	4231	4247	4262	4278	4294	4309	4325	4340
9813	4356	4372	4387	4403	4418	4434	4450	4465	4481	4496
9814	4512	4528	4543	4559	4574	4590	4606	4621	4637	4652
9815	4668	4684	4699	4715	4730	4746	4762	4777	4793	4808
9816	4824	4840	4855	4871	4886	4902	4918	4933	4949	4964
9817	4980	4996								

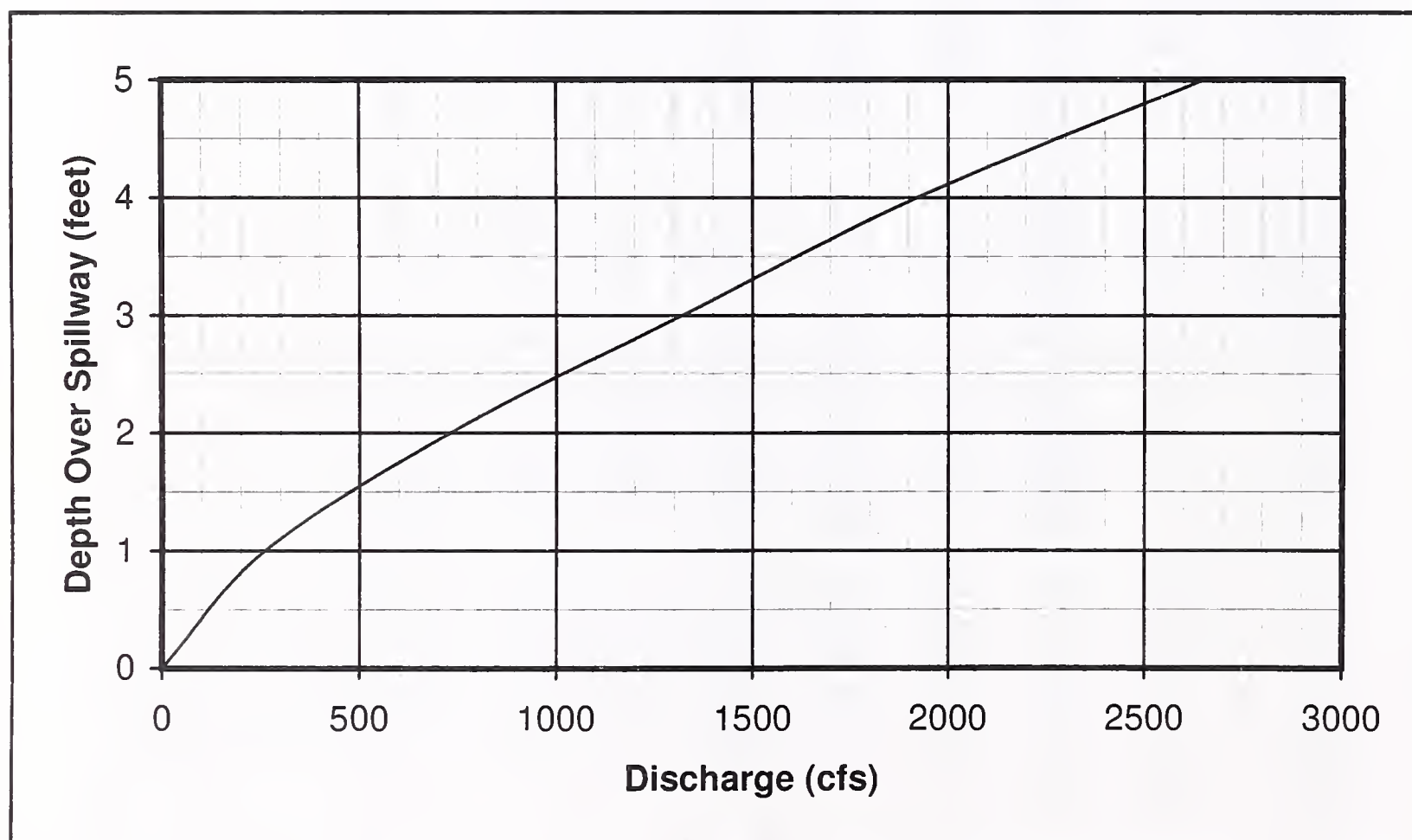
NOTE: Storage table based on 1937 original hand surveys of the reservoir.

Spillway Crest Elevation 9812.0 feet
 Top Of Tower And Dam Crest 9817.0 feet

TABLE 3. SPILLWAY DISCHARGE

GLACIER LAKE RESERVOIR

Depth Over Crest (feet)	Elevation (feet)	Discharge (cfs)
0	9812	0
1	9813	260
2	9814	730
3	9815	1320
4	9816	1920
5	9817	2650

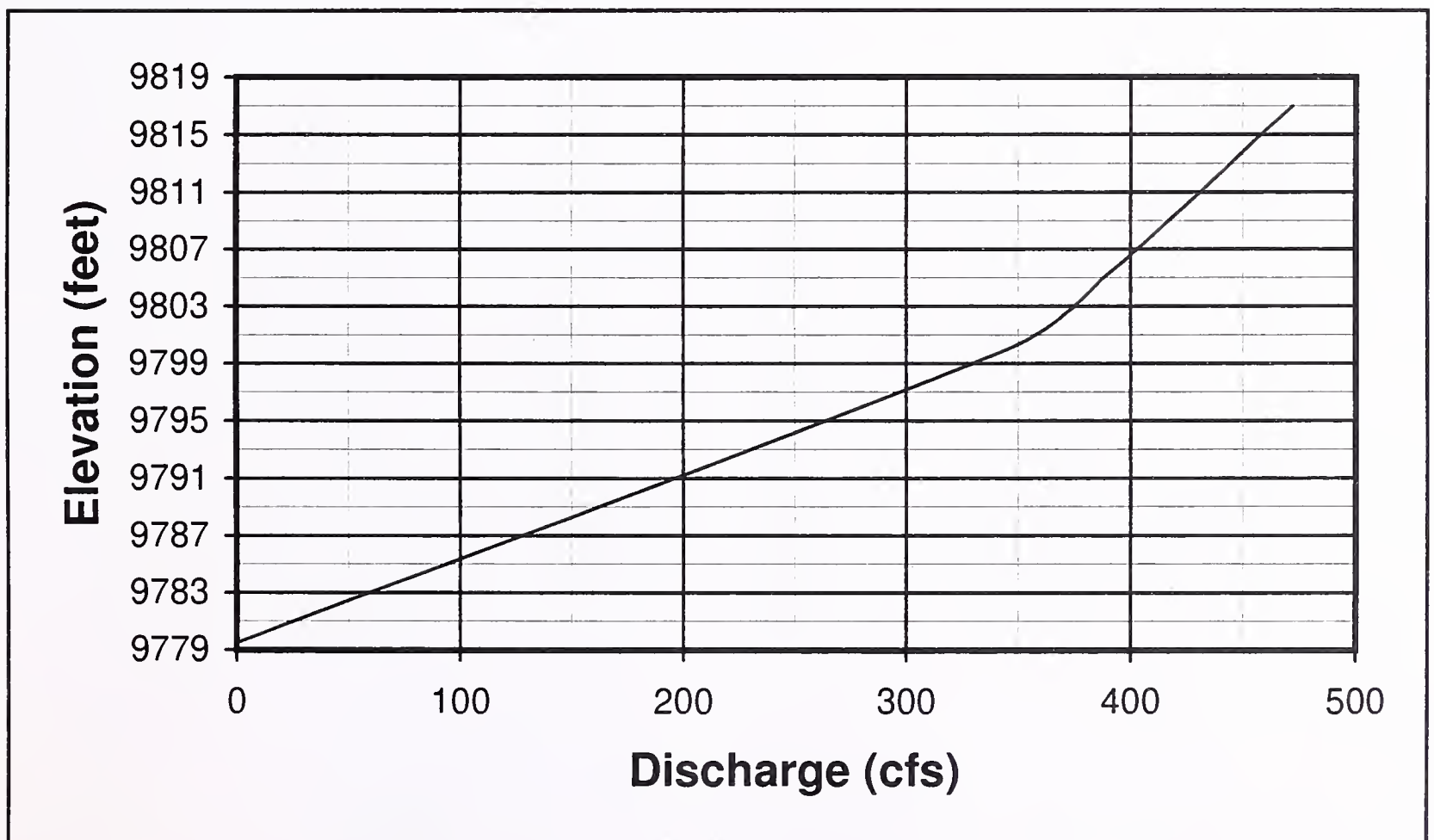


Note: Data from the Corps of Engineers Phase 1 Inspection Report (1981).

TABLE 4. OUTLET DISCHARGE
GLACIER LAKE RESERVOIR

Reservoir Elevation (feet)	Discharge (cfs)
9779.5	0
9800	345
9805	388
9810	424
9815	458
9817	472

Note: Discharge assumes gate is completely open.



Note: Data from the Corps of Engineers Phase 1 Inspection Report (1981).

APPENDIX B

INSPECTION REPORT FORM

DEPARTMENT OF NATURAL RESOURCES AND CONSERVATION
DAM SAFETY INSPECTION REPORT

NAME OF DAM _____
DATE INSPECTED _____

INVENTORY NO. _____
HAZARD CATEGORY _____
TYPE OF DAM _____
YEAR BUILT _____

OWNER _____
OPERATOR _____
STREAM _____
DRAINAGE AREA _____

Reservoir Storage Status

	Water Surface Elevation (feet)	Storage (acre-feet)
At time of inspection	_____	_____
At spillway crest	_____	_____
At min. dam crest elevation	_____	_____

ITEM	YES	NO	REMARKS
------	-----	----	---------

1. EMBANKMENT

A. Crest -- Height= Length= Width=

(1) Any visual settlements?			
(2) Any misalignments?			
(3) Any cracking?			
(4) Any traffic damage?			
(5) Other?			

ITEM	YES	NO	REMARKS
------	-----	----	---------

1. EMBANKMENT (continued)

B. Upstream Face -- Slope=

(1) Any erosion?			
(2) Any longitudinal cracks?			
(3) Any transverse cracks?			
(4) Is riprap protection adequate?			
(5) Any stone deterioration?			
(6) Any visual settlement, slumps, sloughing, depressions or bulges?			
(7) Adequate grass cover?			
(8) Debris on the dam face?			
(9) Other?			

C. Downstream Face--Slope=

(1) Any erosion?			
(2) Any longitudinal cracks?			
(3) Any transverse cracks?			
(4) Any visual settlement, slumps, sloughing, depressions or bulges?			
(5) Is the toe drain dry?			
(6) Are the relief wells flowing?			
(7) Any boils at the toe?			
(8) Any seepage areas?			
(9) Any traffic or animal damage?			
(10) Any burrowing animals?			
(11) Adequate grass cover?			
(12) Other?			

D. Amount and Type of Vegetation on the Dam

--

ITEM	YES	NO	REMARKS
------	-----	----	---------

2. ABUTMENT CONTACTS

A) Any erosion?			
B) Any visual differential movement?			
C) Any cracks?			
D) Any seepage present?			
E) Other?			

3. OUTLET WORKS

A. Intake Structure -- Size=

(1) Any settlement?			
(2) Any tilting?			
(3) Do concrete surfaces show:			
a. Spalling?			
b. Cracking?			
c. Erosion?			
d. Exposed reinforcement?			
(4) Do joints show:			
a. Displacement or offset?			
b. Loss of joint material?			
c. Leakage?			
(5) Metal appurtenances:			
a. Any corrosion present?			
b. Any breakage present?			
(6) Trash rack?			
a. Condition?			
b. Anchor system secure?			
(7) Other?			

ITEM	YES	NO	REMARKS
------	-----	----	---------

3. OUTLET WORKS (continued)

B. Conduit -- Type = Size =

(1) Do concrete surfaces show:			
a. Spalling?			
b. Cracking?			
c. Erosion?			
d. Exposed reinforcement?			
(2) Do joints show:			
a. Displacement or offset?			
b. Loss of joint material?			
c. Leakage?			
(3) Is the conduit metal?			
a. Any corrosion present?			
b. Protective coatings adequate?			
(4) Is the conduit misaligned?			
(5) Any calcium deposits?			
(6) Other?			

C. Gates and Tower

(1) Gates:			
a. Size: Operating:		Emergency:	
b. Type: Operating:		Emergency:	
(2) Controls operational?			
(3) Controls lubricated?			
(4) Operational problems?			
(5) Leakage around gates?			
(6) Condition of gate seals?			
(7) Any cavitation damage? If so, describe?			
(8) Describe air vent-size and condition.			

ITEM	YES	NO	REMARKS
------	-----	----	---------

3. OUTLET WORKS (continued)

C. Gates and Tower (continued)

(9) Is there a jet pump?			
a. Is it operational?			
b. Leakage?			
(10) Is the tower dry? _____ wet? _____			
(11) Any seepage in the tower?			
(12) Condition of the tower?			
(13) Any safety problems?			
(14) Ladder in good condition?			
(15) Condition of the gatehouse?			
(16) Emergency plan completed for the dam?			
a. Posted in the gatehouse?			
(17) Other?			

D. Stilling Basin

(1) Do concrete surfaces show:			
a. Spalling?			
b. Cracking?			
c. Erosion?			
d. Exposed reinforcement?			
(2) Do joints show:			
a. Displacement or offset?			
b. Loss of joint material?			
c. Leakage?			
(3) Do energy dissipaters show:			
a. Signs of deterioration?			
b. Are they covered with debris?			
(4) Other?			

ITEM	YES	NO	REMARKS
------	-----	----	---------

3. OUTLET WORKS (continued)

E. Downstream Channel

(1) Is the channel:			
a. Eroding or backcutting?			
b. Sloughing?			
c. Obstructed?			
(2) Is released water:			
a. Undercutting the outlet?			
b. Eroding the embankment?			
(3) Other?			

4. SPILLWAY

A. Description

(1) Location?			
(2) Type of Spillway?			
(3) Size of Spillway?			
(4) Spillway lining?			
(5) Is there a weir?			
(6) Is the spillway in good condition?			
(7) Any drains?			
a. Describe the condition of drains.			

B. Does spillway show:

(1) Any cracking concrete?			
(2) Any spalling concrete?			
(3) Any exposed reinforcement in the concrete?			
(4) Any erosion?			

ITEM	YES	NO	REMARKS
------	-----	----	---------

4. SPILLWAY (continued)

4. B. Does spillway show: (continued)

(5) Any slope sloughing?			
(6) Any obstructions?			
(7) Displacement or offset joints?			
(8) Loss of joint material?			
(9) Leakage at the joints?			
(10) Other?			

C. Do the energy dissipaters show:

(1) Signs of deterioration?			
(2) Any cracking?			
(3) Any spalling?			
(4) Any exposed reinforcement?			
(5) Are they covered with debris?			
(6) Other?			

D. Has release water:

(1) Eroded the embankment?			
(2) Undercut the outlet?			
(3) Eroded the downstream channel?			
(4) Other?			

E. Emergency Spillway

(1) Is there an emergency spillway?			(If YES, describe)

ITEM	YES	NO	REMARKS
------	-----	----	---------

5. RESERVOIR CONTROL

A) Recent upstream development?			
B) Recent downstream development?			
C) Slides in reservoir area?			
D) Change in reservoir operation?			
E) Large impoundment upstream?			
F) Any debris in the reservoir?			
G) Other?			

6. INSTRUMENTATION

A) List type(s) of instrumentation:			
B) In good condition?			
C) Read periodically?			
D) Is data available?			
E) Include all data gathered since last report.			

7. DOWNSTREAM CONDITION

A. Downstream Land Use.

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This dam was inspected by:

Additional comments and recommendations. *(Use additional pages if necessary)*

APPENDIX C
DISTRIBUTION LIST

GLACIER LAKE O&M DISTRIBUTION LIST

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APPENDIX D

PROJECT DRAWINGS

(NOTE: These reduced project drawings are design drawings and not "As Builts". These drawing should be used for reference only. The SWPB has the full size project drawings.)

